

Mr. Allen clearly had a subarachnoid hemorrhage (seen on CT scan). This type of hemorrhage involves bleeding into the spaces around the brain that are normally occupied by cerebrospinal fluid. Probably the most common cause of this condition-other than trauma- in a young person is that of cerebral aneurysm. Certain categories of drugs such as Cocaine and Amphetamines can also induce this type of bleeding.

In the absence of any evidence that Mr. Allen had taken any of the above mentioned illegal substances, the statistically most likely cause of his hemorrhage was a cerebral aneurysm. This is a small blister on a blood vessel due to a weakening of the vessel wall. Although certain types of aneurysms can occur as a result of trauma, they are much more likely to manifest themselves, i.e. bleed, shortly after the trauma-not two years later as in Mr. Allen's case.

The diagnosis of subarachnoid hemorrhage is often overlooked on initial presentation. Severe headache is the most common symptom of this condition, but is also one of the most common complaints of the general population, with tension and anxiety undoubtedly being the most common cause of this malady. The other frequently associated symptoms include nausea, emesis, and stiff neck- all of which are common symptoms in general. If a subarachnoid hemorrhage is suspected, the initial test would be a CT scan. Depending on the interval between the hemorrhage and the scan, the bleeding may or may not be detected. The size of the hemorrhage also determines whether the CT scan is diagnostic or not. If the scan is negative, and the diagnosis of subarachnoid hemorrhage is strongly suspected, the next test would be a lumbar puncture (spinal tap).

The diagnosis was especially difficult in Mr. Allen's case since he had a long history of headache and / or facial pain. He was followed and treated for this condition, which was post-traumatic, by a Pain Clinic which dispensed and controlled his narcotic analgesic medication. When he initially presented with symptoms in the Emergency Room, he was neurologically intact, and his symptoms did not significantly differ from his chronic complaints. Given these circumstances, I personally think it was reasonable , after assessing his clinical status, to medicate him for the nausea, and send him home with instructions to return if his condition worsened.

Since there was no proof that Mr. Allen actually had an aneurysm, it is pure speculation that his outcome could have been altered if the correct diagnosis was made in a timely manner and the appropriate treatment instituted. I don't believe it is possible to determine from the CT scan that was done upon his return to the hospital, whether there was an aneurysm, or if so, in what area (i.e. anterior or posterior circulation). As I understand the nature of Neurosurgical practice in Anchorage at the time of this incident, some patients with very favorable types of aneurysms might have been treated locally. Clearly, however, complex aneurysm cases were not being treated at that time in Anchorage. The majority of the complex cases, or those deemed appropriate for Interventional Radiology techniques were being transferred to Seattle.

The rapidity of clinical deterioration in Mr. Allen's case suggests to me that his prognosis was extremely poor, regardless of treatment. He went from an alert and neurologically intact state to being deeply comatose in a matter of hours. When this happens in the setting of subarachnoid hemorrhage, a CT scan is usually done to rule out two possible conditions which are treatable. The first is an intracerebral hemorrhage which consists of a blood clot within the substance of the brain. If this clot is substantial

in size and in an accessible location, it would be surgically removed with often substantial clinical improvement of the patient. The second condition looked for on the CT scan is that of hydrocephalus. This is a condition in which the blood from the subarachnoid hemorrhage causes an obstruction to the flow or absorption of spinal fluid which then accumulates under pressure in the ventricles (fluid sacs) of the brain. Draining this fluid surgically often results in significant improvement in the patient's condition. Mr. Allen's CT scan showed neither of these conditions which, in my opinion, means that his prognosis was very poor, regardless of when or where or what kind of treatment was instituted.

Even if one were to speculate that a subarachnoid hemorrhage was suspected on Mr. Allen's initial presentation to the ER, the logistics of pursuing the diagnosis and instituting treatment would have been complicated and time consuming. The CT scan would have taken about an hour (counting scheduling, transport, etc.). If the scan was interpreted as negative or equivocal, he would have then been transferred to the ER from the Urgent Care facility where he would have been evaluated by a physician who presumably would have then done a spinal tap. This whole process would have consumed at least another hour. If the tap was positive for blood, the ER physician would have to contact one of the local Neurosurgeons who presumably would have come to the ER to see the patient or have him transferred to one of the other hospitals in Anchorage. Again one would assume at least another hour for this to take place. Ultimately, a cerebral arteriogram or angiogram would have to be done to definitively diagnose an aneurysm. This usually takes an hour or more to arrange, and the test itself could take several hours. Once the angiogram is interpreted, the definitive treatment plan could be formulated. If that involved transfer to Seattle, several more hours would elapse- by which time Mr. Allen would almost certainly have deteriorated to the point where therapy would likely be futile.

In general, aneurysms are ideally treated within seventy-two hours of the initial bleed. This timeline pertains whether the treatment is surgical or by interventional techniques. The reasoning behind this is two-fold. One is to try to prevent rebleeding. The other is to secure the aneurysm so that if the complication of vasospasm supervenes, it can be treated medically. The peak incidence of vasospasm is between three and ten days post bleed. Most aneurysm centers are reluctant to intervene (by any means) if the patient is in poor clinical condition, i.e. comatose. Studies have shown that the outcome in these cases is very poor - regardless of the nature of the treatment.

*In summary, I feel that the diagnosis was difficult in Mr. Allen's case, and the rapidity of his decline would speak for a very poor prognosis, even if the diagnosis was made early on. The timeline and logistics of diagnosis and treatment were such that it is extremely unlikely, in my opinion, that the outcome could have been affected by any course of action.